Background: Farming ranks among the top occupations for noise-induced hearing loss (NIHL). NIHL is permanent, irreversible, yet preventable. Farms with fewer than 11 employees are exempt from OSHA inspections, and hearing conservation programs are often not implemented. Hearing Protection Devices (HPDs) (i.e., ear muffs and ear plugs) are effective at preventing exposure to noise; however, few farmers report consistent use. Interventions to increase the use of HPDs have historically targeted experienced, older farmers, and lack a theoretical foundation. We developed and tested an intervention to increase the use of HPDs among young adult swine facility workers that coupled constructs from the Social Cognitive Theory with smartphone technology. The intervention tested the three major constructs from the Social Cognitive Theory among three study groups to determine the effect of each construct on HPD use. The Social Cognitive Theory (SCT) has been used as the foundation of many interventions that have successfully modified health behaviors among young adults. Three major constructs of the SCT are 1) environmental conditions; physical and social factors that serve as barriers or facilitators that permit or discourage a particular behavior, 2) personal cognitive factors; the ability to self-regulate behavior, develop self-regulatory skills, and reflect on experiences and 3) behavioral factors; actions that enhance the adoption of a behavior and include personal intention or goal-setting. We utilized smartphone technology to assist in the development of self-regulatory skills and behavioral factors – two constructs of the SCT. Smartphone apps allow behavioral tracking to be an efficient, interactive process and are an appealing intervention platform among young adults.

Methods: A pilot, randomized controlled trial was implemented with 74 participants recruited from the Midwest. Participants were randomized into three groups based on the three constructs of the Social Cognitive Theory. Group 1 received a mailed box of HPDs. Group 2 received the box of HPDs and were instructed to track their daily use of HPD when in swine buildings for 60 days using a smartphone app. Group 3 received a box of HPDs, were instructed to track their daily use of HPDs when in swine buildings for 60 days with the app, and set a daily goal for HPD use within the app. Reported HPD use was compared between study groups at three time points; baseline (before the 60-day behavioral tracking period), immediate post-intervention (after the 60-day behavioral tracking period) and 3-month follow-up (3 months after immediate post-intervention).

Results: We observed an increase in reported HPD use among all three groups at immediate post-intervention. The greatest increase in reported hearing protection use was among Group 3 who reported a mean increase of 47.1%. Group 2 increased reported use by 42.3% and group 1 increased use by 32.0%. At 3-month follow-up, Groups 3 and 2 had decreased reported HPD use and group 1 reported a 4.0% increase in HPD use. Even with the reported decreases, all three groups maintained a statistically significant increase in HPD use from baseline. Differences between groups at follow-up were not significant.

Discussion: The interactive, behavioral theory-based intervention increased the reported use of HPD among swine facility workers from baseline to 3-month follow-up. Results among group 1 indicated modifying the environment by supplying HPDs was effective in increasing HPD use among swine facility workers. This suggests improving access to hearing protection alone may be enough to encourage sustained changes in behavior, and more realistic than encouraging the download and consistent use of a smartphone app. Research examining barriers to acquiring HPDs among agricultural population should be conducted and intervention to increase access developed and tested.

Session B1
Title: Implementation Science and Translation Research in Occupational Health and Safety Settings: Part 2 – Methods for Approaching and Evaluating Implementation Studies
Moderator: Jennifer M. Lincoln

Within occupational health and safety research, much work has been done to develop innovations that have the potential to prevent injuries and save worker lives. In order to meaningfully decrease poor health and safety outcomes for workers, it is imperative that such innovations are widely adopted. Unfortunately, recent studies have demonstrated that relatively few occupational safety and health innovations have been fully integrated into practice. Recent research indicates only 17% of fishing research had made it to the implementation phase. Similar results were found in a study conducted by fellow implementation science researchers; however, taking into account the need for formative research in earlier stages and widespread worker adoption, even

fewer examples of published research documenting successful implementation within the agriculture, forestry, and fishing industries were reported. As described, a major gap exists in moving evidence-based innovations into widespread use. Despite this, there are numerous frameworks and theories supporting such efforts that have primarily been applied in clinical settings. This session will provide an overview of these methods in order to enhance participant's understanding of how to progress toward closing the research to practice gap.

Workshop Aims: The overarching goal of this workshop is to provide participants with a general understanding of implementation science frameworks and theories so that they may begin to assess how they can move their own research into widespread practice. Together with the session titled "Understanding Implementation Science and Translation Research in Occupational Health and Safety Settings: Part 1 – Introduction and Process Models," participants will gain a better understanding of the implementation science field, including the need for implementation science research, challenges related to implementation efforts and examples from the field. Upon completing this workshop, participants will be able to: 1. Give examples of implementation science methods used across various occupational safety and health settings; 2. discuss key factors that impact implementation science efforts in occupational safety and health settings; and 3. discuss frameworks and theories used for evaluating implementation science efforts.

Overview: This workshop will focus on methods used for implementing innovations among target populations and evaluating efforts. Implementation will be examined first based on standard development and regulation. As not all issues can be solved through regulation, the conversation will then focus on how to encourage end users to adopt safer work practices through social marketing. Presenters will also discuss the development and use of partnerships to enhance implementation activities. Finally, an overview of implementation frameworks and models for evaluating progress will be discussed. Raising Awareness and Removing Barriers to Address Occupational Safety Concerns Between 2010 and 2014, nine workers died while working around open tank hatches at oil and gas wellsites. Exposure to hydrocarbon gases and vapors and oxygen deficiency are believed to be factors. In response to the identification of this hazard by NIOSH and its partners, the American Petroleum Institute (API) developed and published a new safety standard (API 18.2) promoted safer, alternative methods for crude oil measurement. API 18.2 was adopted by the Department of the Interior's Bureau of Land Management (BLM) to allow companies to protect workers while maintaining compliance with BLM regulations. Measurement methods that do not require a worker to open a tank hatch will improve safety and health at wellsites. This session of the workshop will explore how standards were changed to provide a safer method for oil and gas workers to perform necessary tasks without the hazards associated with exposure to hydrocarbon gas and vapor exposures. The presenter will discuss the process which included: using NIOSH data to identify the problem; developing and disseminating communication products to make workers and employers aware of the hazard; and ultimately the change to an industry standard and adoption of that new standard by the Bureau of Land Management. When Regulation Doesn't Work: Social Marketing to Increase Worker Adoption Marketing strategies are often used by large corporations to encourage populations to participate in a number of activities. Using similar methods, social marketing aims to encourage behavior changes that will benefit the wellbeing of populations. Using the example of overexertion injuries from the construction sector, the presenter will discuss the basics of social marketing, and how these campaigns are developed and implemented to correct occupational safety and health issues. Formative research is a key component of developing successful social marketing interventions. Thus, the stages of formative research, including both data collection and analysis to identify current practices, barriers to behavior change, and strategies for overcoming barriers will be discussed. In addition, the presenter will discuss how the results of formative research can be used to develop the complete social marketing package. Finally, considerations for developing and implementing social marketing interventions will be discussed. Mobilizing Stakeholders to Facilitate Research to Practice Whether focusing on standard development or behavior change, researchers, alone, often lack the wide variety of knowledge and resources necessary to take innovations across the full spectrum of identifying research priorities, developing and testing innovations, widely implementing those innovations, and improving health and safety outcomes. As such, partnerships are often necessary components of implementing effective innovations. This portion of the workshop will focus

on understanding the process and benefits of developing and maintaining collaborative relationships. Using examples from the agriculture, forestry, and fishing settings, the presenter will discuss when, how, and why partnerships form. In addition, the presenter will discuss challenges related to starting or maintaining these relationships, and the benefits to each involved organization or individual. Methods for Evaluating Implementation Efforts Before diving into implementation studies, it is important to understand the frameworks and theories available for guiding and evaluating the implementation process. The Consolidated Framework for Implementation Research and the Theoretical Domains Framework will be explored. These two frameworks have been comprehensively developed and evaluated with other implementation frameworks in mind. Though both have primarily been used in clinical settings, they show promise for application in occupational safety and health research. Methods for adapting the frameworks to the specific issue will also be addressed. Finally, this session will help participants understand how to choose and adapt a framework or theory for their own implementation studies.

Moderator: Jennifer M. Lincoln, PhD is an injury epidemiologist at NIOSH, where she serves as both the director of the Center for Maritime Safety and Health Studies and Associate Director for Science for the NIOSH Western States Division.

Presenters: David Caruso is a senior health communication specialist and the coordinator for the NIOSH Oil and Gas Safety and Health Program. Eileen Betit is the Research to Practice Director at CPWR-The Center for Construction Research and Training. Theodore Teske is a health communication specialist for the NIOSH Western States Division. Pam Tinc is a Junior Research Investigator at the Northeast Center for Occupational Health and Safety: Agriculture, Forestry, Fishing and a PhD candidate at Umeå University.

Session B2
Title: Collaborating with Industry Partners to Understand Work-Related Motor Vehicle Crashes
Moderator: Stephanie Pratt

The four papers in this session will demonstrate the value of collaborating with organizations and individual companies to better understand: worker attitudes and driving behaviors, demographic and employment factors associated with collisions and injuries, and the relationship between safety program elements and road safety performance. The research included in this session used a range of methods: surveying workers directly; confirming validity of a driving-behavior instrument for use in a new worker population; using linked data on drivers, vehicles, and events to examine collisions and injuries and calculate exposure-based rates; and combining data on road safety performance and a survey of program elements from almost 70 companies to determine which program elements are associated with the lowest collision rates.

B2.1
Title: Characteristics of Driving While Tired Among Taxi Drivers in Two Large Metropolitan Areas: Job Demands Consistently Matter
Authors: Cammie Chaumont Menéndez, Christina Socias-Morales, Srinivas Konda, Marilyn Ridenour

Background: Fatigue is increasingly recognized as a crucial and realistically modifiable component of road safety. Workers who drive for a living and transport passengers on-demand in heavily trafficked road networks are a particularly high risk workforce where fatigue is both a health outcome resulting from typical job duties and a risk factor for work-related injuries and fatalities. Fatigue is estimated to be a causal factor in at least 1 in 5 fatal U.S. crashes. Naturalistic studies evaluate sleep patterns and driving times in great detail but generally do not survey drivers for work environment or individual factors which may play a role in fatigued driving. We analyzed individual factors, work environment, and business-related aspects of driving a taxi to assess associations of these variables with driving while tired among taxi drivers in two large metropolitan areas.

Methods: Licensed taxi drivers in Houston and Los Angeles were invited to participate in a 30-minute survey designed to measure business-related aspects to driving a taxi such as scheduling and driving times, job demands and company safety climate, passenger violence, motor vehicle crashes, installed safety equipment, safety training, safe driving habits and individual factors. The Occupational Driver Behavior Questionnaire provided the driving while tired subscale where drivers supplied Likert responses to frequency of (1) driving while tired, (2) having difficulty driving because of tiredness or fatigue, and (3) nodding off while driving.

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